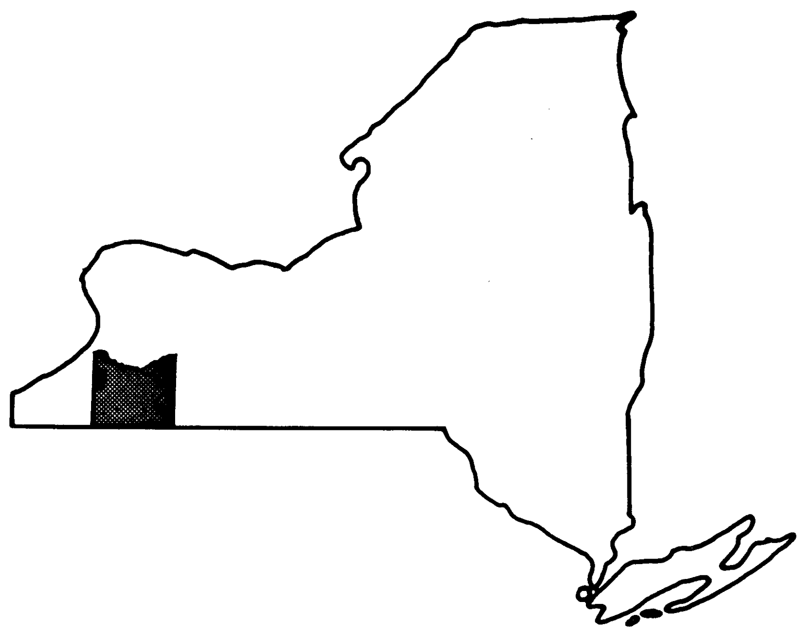
FLOOD INSURANCE STUDY

VILLAGE OF SOUTH DAYTON, NEW YORK
CATTARAUGUS COUNTY



JULY 1977

U.S. DEPARTMENT of HOUSING & URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

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FLOOD INSURANCE STUDY
VILLAGE OF SOUTH DAYTON, NEW YORK

1.0 INTRODUCTION

1.1 Purpose of Study

The purpose of this Flood Insurance Study is to investigate the existence and severity of flood hazards in the Village of South Dayton, Cattaraugus County, New York, and to aid in the administration of the Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Initial use of this information will be to convert South Dayton to the regular program of flood insurance by the Federal Insurance Administration (FIA). Further use of this information will be made by local and regional planners in their efforts to promote sound land use and flood plain development.

1.2 Coordination

At a meeting on July 31, 1975, with representatives of the Village of South Dayton, the FIA, the Cattaraugus County Planning Board, the U. S. Army Corps of Engineers (COE), the Soil Conservation Service (SCS) of the U. S. Department of Agriculture and the New York State Department of Environmental Conservation (DEC), the purpose of the Flood Insurance Study was explained.

A search for basic data was made at all levels of government. The COE and the SCS provided information which served as part of the input for the hydraulic analysis. Information regarding flow data was unavailable as there are no existing flow records on the West Branch Conewango Creek in this area.

On August 25, 1976, a meeting was held with officials of the village to obtain additional local input. The final meeting of consultation and coordination (CCO) was held on January 19, 1977, where the final draft of the Flood Insurance Study was presented to the community for further local comment.

1.3 Authorization and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968, as amended.

The hydrologic and hydraulic analyses for this study were performed by the New York State Department of Environmental Conservation for the Federal Insurance Administration, under Contract No. H-3856. This work, which was completed in December 1976, covered all flooding sources in the Village of South Dayton.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Village of South Dayton. The area of study is shown on the Vicinity Map (Figure 1).

The West Branch Conewango Creek flows through the southwest corner of the village in a southerly direction, a distance of 3,830 feet. Because of the potential for new development in this area of the village, it was agreed among representatives of the study contractor, the FIA and the Village of South Dayton that the West Branch Conewango Creek was to be studied in detail for a length of 0.87 miles. At present, there is virtually no development in the flood plain of the West Branch Conewango Creek in South Dayton.

It was agreed to study by approximate methods four unnamed tributaries totaling 0.51 miles in length, which have their confluence with Slab City Creek outside the eastern boundary of the village. These four tributaries are near Dexter Corners Road and Dredge Road.

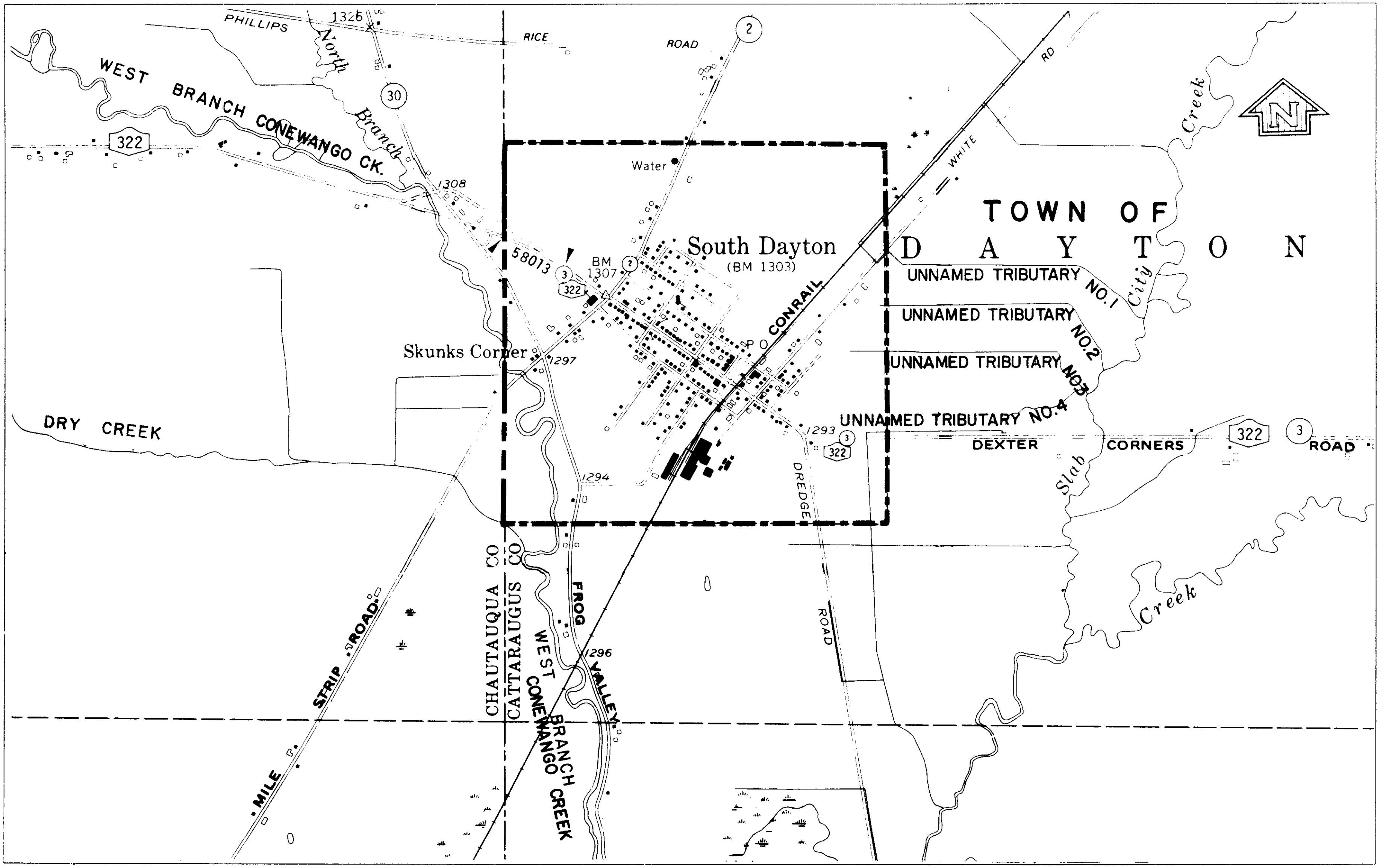
The areas studied by detailed methods were selected with priority given to all known flood hazard areas, areas of projected development and proposed construction for the next five years through March 1981.

Approximate methods of analysis were used to study those areas having low development potential and/or minimal flood hazards as identified at the initiation of the study. The scope and methods of study were proposed to and agreed upon by FIA.

2.2 Community Description

The Village of South Dayton, is located entirely within the Town of Dayton in Cattaraugus County on the Cattaraugus-Chautauqua County border in southwestern New York. The village has an area of one square mile.

The village is located in the Conewango Creek Watershed which is characterized by two distinct physiographic areas; an upland area of



DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

VILLAGE OF SOUTH DAYTON, NY
(CATTARAUGUS CO.)

APPROXIMATE SCALE
0 2000 4000 6000 8000 FEET

VICINITY MAP

FIGURE 1

moderately steep topography, and a broad, flat valley floor. Approximately one quarter of the village is in an area of steep topography, while the remainder is in the wide, flat valley. The valley with a width from two to three miles, has been filled with till and other glacial deposits. These deposits are alluvial glacial lake types which are generally subject to erosion and poor drainage conditions.

After leaving the village the West Branch Conewango Creek flows in a southerly direction slightly less than 3 miles to its junction with Conewango Creek. Conewango Creek then flows southerly into the Commonwealth of Pennsylvania to the City of Warren where it empties into the Allegheny River. The Allegheny River, which rises in Pennsylvania and makes a broad loop through southwestern New York State, continues to Pittsburgh where it joins with the Monongahela River to become the Ohio River.

Land use in the area around the village is divided between agricultural uses and forest and brush cover, in nearly equal proportions. Incorporated in 1915, the village is a small residential and commercial center for the outlying agricultural community. The population of the village has dropped from 969 people in 1960 to 688 in 1970, a decline of 29 percent, which can be attributed to declining employment opportunities (Reference 1). It is expected that this rapid decline will level off but that the village will not experience significant growth for the forseeable future.

Precipitation in the watershed averages 42 inches per year, of which approximately 23 inches becomes runoff. Precipitation is generally well-distributed throughout the year, with slightly lower monthly averages during January through April period. It is during this period, however, that major storms often occur, resulting in sudden intense downpours. The area has a mean annual snowfall of 82 inches and an average annual temperature of 46°F (Reference 2).

Portions of the flood plain along the West Branch Conewango Creek are illustrated in Figures 2 and 3.

2.3 Principal Flood Problems

The study area is subject to flooding by three different types of storms. The worst condition occurs in late winter when warm rains of long duration fall on snow covered, frozen ground. Floods during the growing season generally occur from intense rainfall accompanying transcontinental or tropical type disturbances. A third type of

Figure 2 - West Branch of Conewango Creek at Mile Strip Road looking south (downstream).

Figure 3 - West Branch of Conewango Creek at Mile Strip Road looking north (upstream).

storm is the intense convective type of limited areal extent and short duration but which causes flooding on tributaries to the mainstream, occuring mostly during the summer season.

The flood hazard caused by seasonal conditions and/or storms is aggravated by the reduction of channel capacities, due to erosion and sedimentation, to the point that existing channels are inadequate to remove heavy runoff in a reasonable period of time.

There are no gaging stations or dependable records of major floods within the study area.

In the eastern part of the village, poor drainage near the tributaries to Slab City Creek causes some flooding in this area.

2.4 Flood Protection Measures

There are no flood control measures located within the village corporate limits. Benefit is derived from the Conewango Creek Watershed Project of the SCS (Reference 3). The watershed project is an improvement plan to provide watershed protection, flood prevention, public and private fish and wildlife development, and agricultural water management. This is to be accomplished through the construction of 20 floodwater retardation structures, 8 of which are complete, and 30 miles of various channel improvements. This long range project was authorized in April of 1968 and scheduled for completion by 1980. However, progress in the watershed has been delayed until some additional replanning is completed and an environmental impact statement is prepared. This will delay completion until 1982.

Several miles below the Village of South Dayton is the "Dredge", which is an eight mile long drainage ditch constructed in 1898 by the State of New York with the aid of local interests. At the time of its completion the drainage ditch alleviated flooding problems in the lowland areas. The drainage ditch still carries a large portion of the runoff from the basin, but it has largely lost its effectiveness in lowering flood stages because of the formation of obstructions in the ditch and in Conewango Creek below the lower end of the ditch.

3.0 ENGINEERING METHODS

The detailed analyses of the West Branch Conewango Creek utilized standard hydrologic and hydraulic study methods to determine the flood haza data required for this study. Floods having recurrence intervals of 10, 50, 100 and 500 years have been selected as having special significance for flood plain management and for flood insurance premium rates. The analyses reported here are based on current conditions in the watershed of the stream.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each stream studied in detail in the community.

To establish the hydrology for uncontrolled drainage areas larger than 5 square miles, the DEC performed a regional analysis using data from the U. S. Geological Survey (USGS). Drainage areas ranged from 3.6 to 430 square miles for the 22 gaging stations used in the regional analysis. Stream gaging records for maximum peak flow (Reference 4) were used to establish Exceedence Interval/Discharge Curves at selected points along the waterways of the Allegheny River Basin. The statistical methods used in the regional analysis are those presented by Leo R. Beard (1962) (Reference 5). The methodology conforms with the uniform technique for determining flood flow frequencies as set forth by the Hydrology Committee of the Water Resources Council (Reference 6).

Because of the large amount of detention storage within the Conewango Creek Watershed, a Bureau of Public Roads technique (Reference 7) was used to determine the flow for the base flood. The value obtained was verified against flow records from USGS Waterboro, New York Gage (period of record: 1938 to present, drainage area: 290 square miles) which were adjusted using a drainage area ratio. The flood flow frequency relationship obtained from the regional analysis was used to determine flood flows for other frequencies.

A summary of the drainage area and discharges for the selected recurrence intervals is included in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
WEST BRANCH CONEWANGO CREEK					
Southern village boundary	40.2	1,130	1,618	1,837	2,372

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the West Branch Conewango Creek, studied in detail, were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along the stream.

Flood profiles were calculated using the COE HEC-2 step-backwater computer program (Reference 8).

Cross sections, which had locations and geometry determined by field survey, were located at close intervals above and below bridges, at control sections along the stream length, and at significant changes in ground relief and land use or land cover. Locations of representative cross sections are indicated on the Flood Boundary and Floodway Map (Exhibit 2).

Reach lengths for the channel were measured along the centerline of the channel between sections and overbank reach lengths were measured along the approximate centerline of the effective out-of-channel flow area.

Roughness coefficients (Manning's "n"), ranging from 0.03 in the channel to 0.05 in the overbank areas, were assigned on the basis of on-site field inspections and ground level photographs. These "photographs" were compared with USGS calibrated photographs (Reference 9), taking into consideration channel conditions, overbank vegetation and land use.

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals (Exhibit 1). All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD), formerly referred to as mean sea level datum with the 1929 general adjustment; elevation reference marks used in the study are shown on the maps.

Flood elevations higher than those computed through the use of HEC-2 step-backwater program can occur as a result of the effect of ice jams during spring thaws. However, adequate data are not available to establish stage frequency curves during ice periods. The hydraulic analyses for this study are based only on the effects of unobstructed flow. The flood elevations as shown on the profiles are thus considered valid only if hydraulic structures in general remain unobstructed.

For the four stream reaches studied by approximate methods, estimates of discharges and slopes and a field view of the streams were used to determine the 100-year flood limits for these streams.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

A prime purpose of the National Flood Insurance Program is to encourage state and local governments to adopt sound flood plain management programs. Each Flood Insurance Study, therefore, includes a flood boundary map designed to assist the village in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the FIA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community.

For the reaches studied in detail, the boundaries of the 100- and the 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps at a scale of 1"=400' with a contour interval of 5 feet (Reference 10). In cases where the 100- and the 500-year flood boundaries are close together, only the 100-year boundary has been shown.

For the areas studied by approximate methods, flood boundaries were delineated on the previously mentioned maps using an estimate of discharges and slopes and field inspection of the streams. The boundaries of the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map (Exhibit 2).

Small areas within the flood boundaries may lie above the flood elevations and, therefore, may not be subject to flooding; owing to limitations of the map scale, such areas are not shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. Minimum standards of the FIA limits such increases in flood heights to one foot, provided that hazardous velocities are not produced.

The floodway in this report is presented to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

The floodway in this study was computed on the basis of equal conveyance reduction from each side of the flood plain. The results of these computations are tabulated at selected cross sections for the stream studied in detail (Table 2).

As shown on the Flood Boundary and Floodway Map (Exhibit 2), the floodway boundaries were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or colinear, only the floodway boundary is shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 4.

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FIA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHF), and flood insurance zone designations for each flooding source affecting the Village of South Dayton.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD 1929)	WITHOUT FLOODWAY (NGVD 1929)	DIFFERENCE (FT.)
West Branch Conewango Creek							
A	170	84	404	4.55	1,290.6	1,290.0	0.6
B	1,470	162	535	3.43	1,292.1	1,292.0	0.1
C	3,220	93	501	3.67	1,293.5	1,293.4	0.1
D	3,426	62	502	3.66	1,293.6	1,293.6	0.0
E	3,670	142*	747	2,46	1,293.9	1,293.9	0.0

[1]FEET ABOVE MOUTH
*PART OF FLOODWAY OUTSIDE CORPORATE LIMITS

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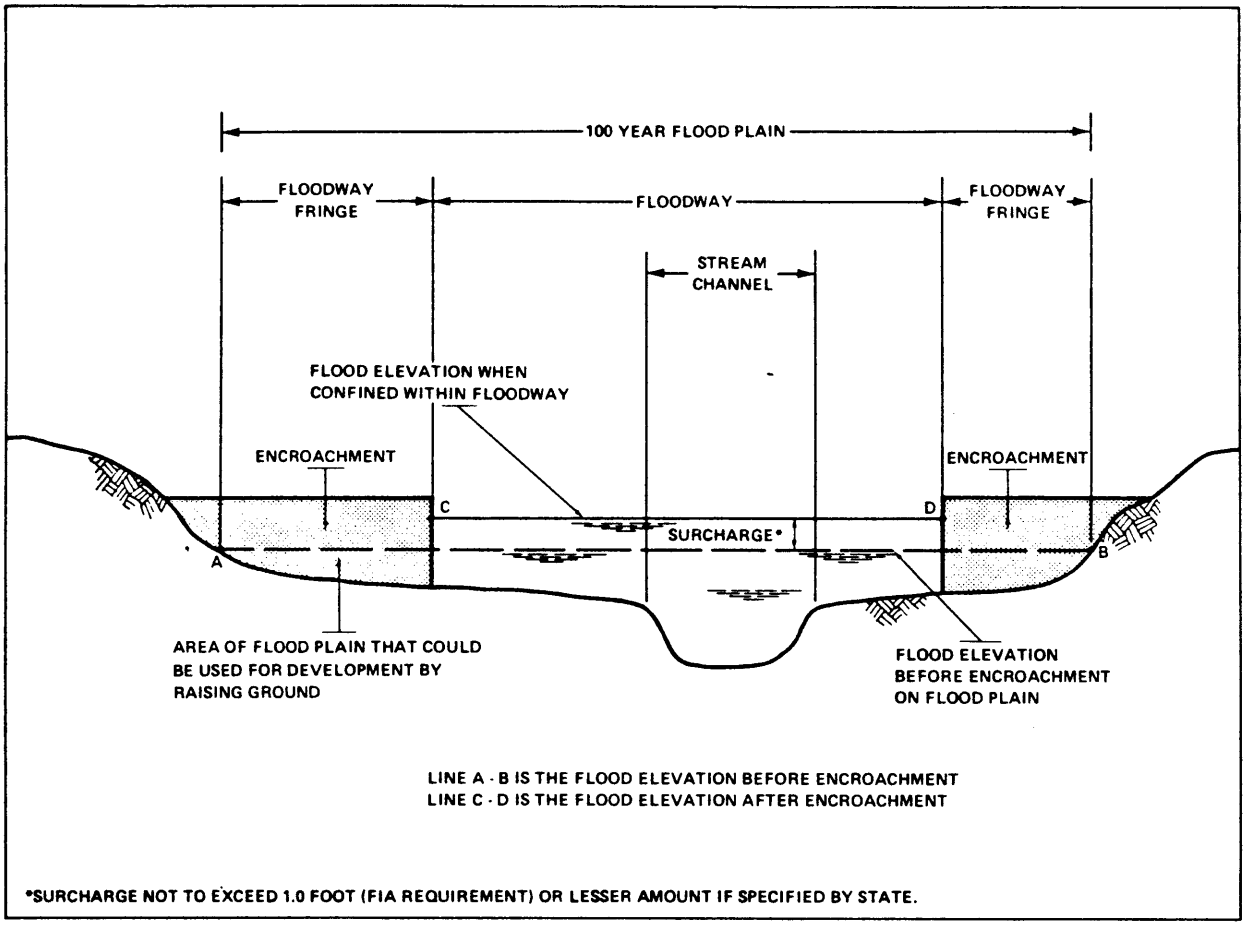
Federal Insurance Administration

VILLAGE OF SOUTH DAYTON, NY
(CATTARAUGUS CO.)

FLOODWAY DATA

WEST BRANCH CONEWANGO CREEK

TABLE 2



FLOODWAY SCHEMATIC Figure 4

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations of the 10- and 100-year floods. For this study, this difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-Year Floods	Variation
Less than 2 feet	0.5 foot

One reach meeting the previous criterion was required to establish flood insurance zones for the West Branch Conewango Creek within the Village of South Dayton. The location of the reach is shown on the Flood Profiles (Exhibit 1).

5.2 Flood Hazard Factors

The FHF is the FIA device used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHF are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest one-half foot, and shown as a three-digit code. For example, if the difference of water-surface elevations between the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire area of study was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following Flood Insurance Zone Designations:

Zone A: Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods with no base flood elevations shown or FHFs determined.

Zone A4: Areas inundated by the 100-year flood, determined by detailed methods, base flood elevations shown and zone designations assigned according to FHF.

Zone B: Areas between the limits of the 500-year flood (including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; and areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot). Zone B is not subdivided.

Zone C: Areas not subject to flooding by the 500-year flood, including areas that are protected from 500-year floods by dike, levee, or other water control structure; not subdivided.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for the flooding source studied in detail in the Village of South Dayton.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Village of South Dayton is, for insurance purposes, the net result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the FIA.

6.0 OTHER STUDIES

One other flood study for the Village of South Dayton has been produced by the SCS and is part of a larger study entitled "Watershed Work Plan, Conewango Creek" (Reference 3). No flood elevations were determined in the SCS study but other aspects of the study are in agreement with this Flood Insurance Study. Flood Insurance Studies are currently underway by the DEC for other communities contiguous to the Village of South Dayton, and these will be in complete agreement with the South Dayton Study.

7.0 LOCATION OF DATA

All data necessary to reproduce the Flood Insurance Study are being retained until January 1, 1985, at New York State Department of Environmental Conservation, 50 Wolf Road, Albany, New York 12233. These data include base maps, topographic maps, cross-section survey data, backwater computations, and other supporting information.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3]
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
West Branch Conewango Creek Reach 1	0001B	-1.80	-0.53	+0.83	020	A4	Varies

[1]FLOOD INSURANCE RATE MAP PANEL
[2]WEIGHTED AVERAGE
[3]ROUNDED TO NEAREST FOOT

TABLE 3

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

VILLAGE OF SOUTH DAYTON, NY
(CATTARAUGUS CO.)

FLOOD INSURANCE ZONE DATA

WEST BRANCH CONEWANGO CREEK

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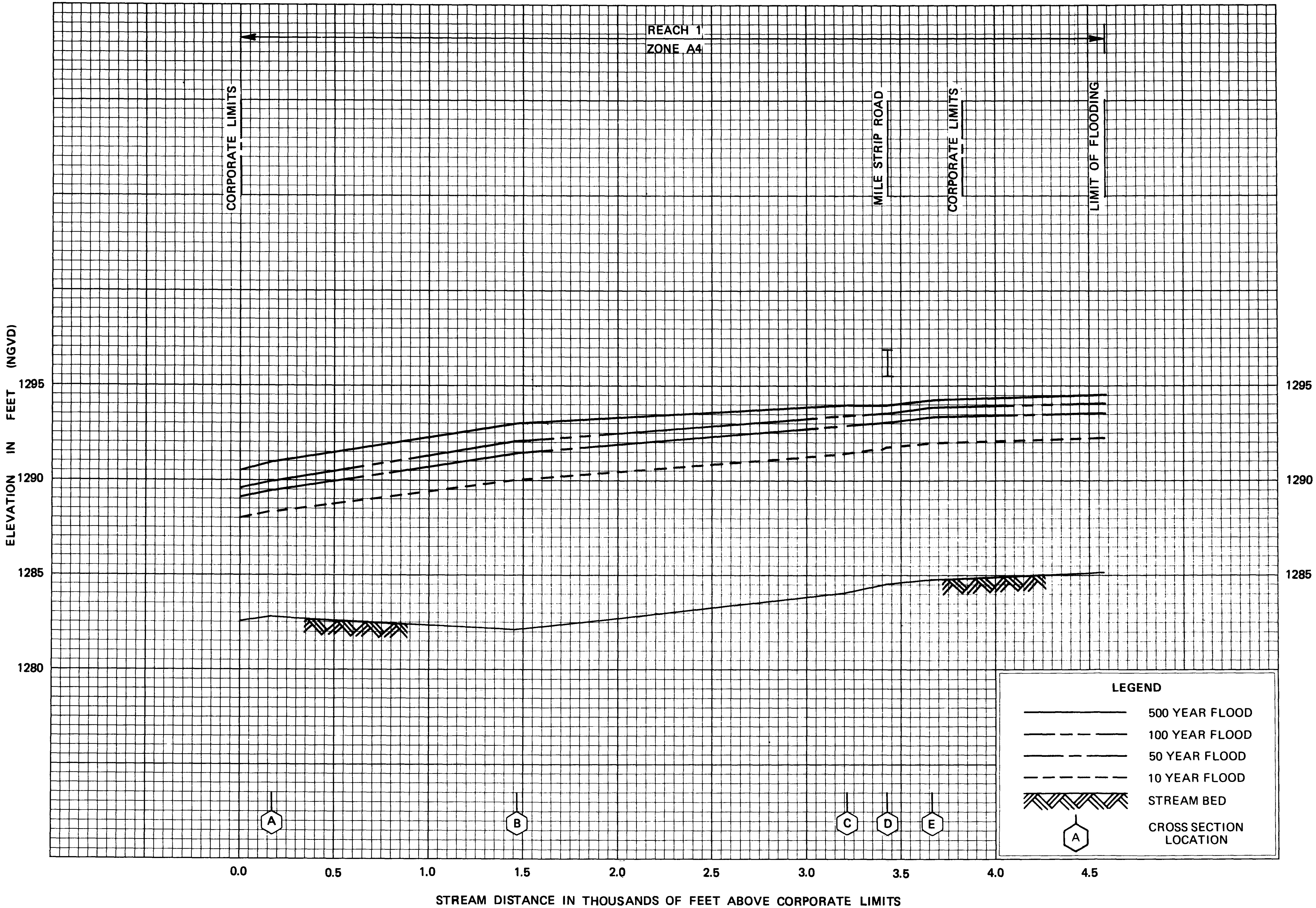

FLOOD PROFILES

WEST BRANCH CONEWANGO CREEK

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
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VILLAGE OF SOUTH DAYTON, NY
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